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NIF

May 2001

Focus on NIF

The National Ignition Facility, a stadium-size, 192-beam laser, is an essential tool for maintaining the safety and reliability of our nuclear weapons, harnessing fusion energy for future generations, and unlocking the origins of the universe.

Overall Assessment

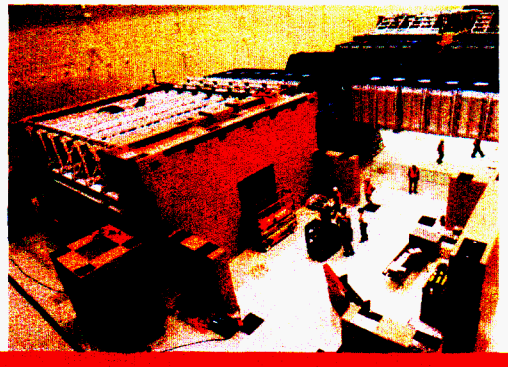
In the FY2001 Energy and Water Appropriations Act (FPN00-48), Congress appropriated $199.1 million for the continued construction of NIF. Immediately (October 27, 2000), $130 million became available. After March 31, 2001, $69.1 million was to be made available only after Department of Energy certification to Congress regarding six specific points: (1) recommend an appropriate path forward for the project; (2) certify that all established project and scientific milestones are on schedule and cost; (3) conduct 1st and 2nd quarter project reviews in FY01 and determine the project is on schedule and cost; (4) study alternatives to a 192-beam ignition facility for the stockpile stewardship program (SSP); (5) implement an integrated cost-schedule earned-value project control system; and (6) create a five-year budget plan for the SSP. On April 6, 2001, General John Gordon, Administrator of National Nuclear Security Administration (NNSA), the U.S. Department of Energy, forwarded to Congress the required certification. Clarifying letters from NNSA were also sent April 13 and subsequently, the additional $69.1 million was released to the NIF project. The complete set of letters and supporting documentation is available at: http://www.dp.doe.gov/dp_web /news_f.htm (What's New, NIF Certification).

Technical Status

√ Workers installed and tested equipment used at the amplifier work center in the Optics Assembly Building (OAB) Class 100 clean room. OAB work centers are used for assembling line- replaceable units (LRUs). This is the first work center to be installed and tested. It consists of a New Optics Insertion Device (NOID), which manipulates and inserts laser glass slabs into the amplifier LRU frame and an assembly stand where the frame is assembled and supported during laser glass insertion. The equipment was tested for functionality, load capacity, and cleanliness. The NOID was tested through its full range of vertical, rotational, and horizontal motion. The assembly stand was tested in rotation and tilt, and its load test verified the capacity of the equipment at 125% of the maximum allowable load. Both pieces of equipment were tested for cleanliness and met all requirements for Class 100 clean room operation (similar to conditions found in semiconductor manufacturing facilities). Commissioning the work center is the next step and involves test assembly of amplifier LRUs using first-article hardware and surrogate laser glass slabs and completing the process map for amplifier LRU assembly. The test assembly activity allows workers to refine the process map, which graphically outlines the LRU assembly process from start to finish. generate draft assembly procedures, and improve estimates of process cycle times.

√ Scientists conducted an inert gas and vacuum management prestart review to assess readiness to proceed with the vacuum testing of the cavity and transport spatial filters, an essential part of the Integrated Safety Management work authorization process. (Spatial filters keep the laser beams focused as they move through the system.)

√ Technicians assembled and aligned the fourth bundle of amplifier buses. One amplifier bus consists of one main amplifier (made up of eleven frame assembly units) and one power amplifier (made up of seven frame assembly units). The amplifier buses are now in storage, ready to be inserted into the laser system.



Wearing hard hats, clean room booties and beard and hair nets, NIF workers install amplifier trusses (white framework nestled in the beige base in left foreground of picture) in Laser Bay 2.

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NIF

Ministry of Defense

Schedule Cost and Analysis

The NIF Project received $6.2 million from the United Kingdom for the Shot Rate Enhancement Program (SREP), which provides technical enhancements to increase NIF's shot availability (lessen its downtime). The remaining $600,000 is being transferred and should be available this month. An additional $10 million is expected late this summer.

Recent Reviews, Reports, and Visits

On **March 30, 2001,** Department of Energy Secretary Spencer Abraham issued the **Final Supplemental Environmental Impact Statement Record of Decision** and it was published in the Federal Register on April 5, 2001. There were no comments from the public.

On April 10, 2001, General Gordon, Admiral Richard Mies, Commander-in-Chief of the U.S. Strategic Command, and Brigadier General Thomas Gioconda, acting Deputy Administrator for Defense Programs, NNSA, toured NIF.

A Direct Drive Workshop, April 11–12, 2001, at LLNL concluded that the NIF design and construction does not preclude direct drive operation at some future date. There are two ways to achieve inertial fusion: indirect drive and direct drive. Indirect drive (the method that will be used with the initial implementation of NIF) involves laser beams heating the inside walls of a cylinder and creating x-rays, which then hit the target contained inside the cylinder. Direct drive involves the laser beams directly hitting the target.

A Diagnostics Review, held **April 30–May 1, 2001,** a part of the NIF Directorate's annual review process, assessed the status of the core target physics diagnostics that will be available to NIF users.

NIF Industrial Partners

Lukas Machine, a small, woman-owned, minority business located in Seattle, WA, is machining $4.1 million worth of flashlamp window assemblies, part of the frame assembly units for NIF. The assemblies use inexpensive glass to shield the expensive laser glass components from being damaged should flashlamps fail. Flashlamps provide energy to the laser glass which is transfered to the laser beam as it passes through the glass. The flashlamp window assemblies are important in maintaining the high reliability of the laser system and in keeping NIF operations and maintenance costs low. Lukas is fabricating 1,752 flashlamp window assemblies, each 78"x 28," which look like screen doors without the screens. These are difficult to fabricate because the assemblies are thin and prone to flex, but need to be very flat to easily slide into place. Lukas is also fabricating 48 large refrigerator-size vacuum chambers that are part of the final optics system that converts the laser wavelength and focuses the light onto a BB-size target in the NIF 10-meter-diameter target chamber. Mounted inside each vacuum chamber will be four shoe-box-size calorimeters that measure the energy in the laser beam. Lukas Machine has been machining parts for large laser systems (Shiva, Novette, Nova, and Beamlet) at LLNL since 1968. Lukas' website is www.Lukasmachine-fab.com.

Early this year, **Jacobs Engineering** began installing and assembling the structural steel to support the beam path and utilities for NIF. This $230 million Integration, Management, and Installation contract is for four years and includes professional services, subcontracted work, and self-performed work – work performed by crafts people hired directly by Jacobs. The third largest engineering firm in the country, Jacobs Engineering brings broad industry construction experience to NIF. From pharmaceutical and biotechnology industries, Jacobs brings skills in working with stringent cleanliness requirements during fabrication, installation, and operations. From pulp and paper manufacturing plants, Jacobs brings skills working with alignment of critical systems. And from chemical and petrochemical plants, Jacobs brings skills working with a variety of process piping: gas and water utilities, vacuum and pressure systems, and cryogenics. Jacobs has pulled together their best technical, engineering, and construction personnel from 18 states and 15 different Jacobs operations. Jacobs Engineering's website is www.jacobs.com.

Jacobs Engineering workers install one of seven amplifier trusses in Laser Bay 2. Jacobs workers also erected a scaffold on the Cluster 3 preamplifier support structure, assembled a fourth movable clean room, and moved concrete blocks into position to align the amplifier structure and rails under the Cluster 3 main amplifier and power amplifier in Laser Bay 2.

National Ignition Facility